



# Observations from the GOES-R Solar UltraViolet Imager Extended Coronal Imaging Campaign

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## Abstract

Solar corona in **17.1nm** and **19.5nm** wavelengths up to three solar radii from Sun center was observed by the **Solar UltraViolet Imager (SUVI)** on the Geostationary Operational Environmental Satellite (GOES) – 16 and GOES-17. The nominally Sun-pointed SUVI was off-pointed to the left and to the right of the Sun center at a regular cadence and a composite **Extended Coronal Imaging (ECI)** frame was created. The imaging area in the composite is about three times the nominal image area in the East-West direction (about  $5 \times R_{\text{Sun}}$  versus  $1.6 \times R_{\text{Sun}}$  for nominal images). The campaign was conducted in February (4 hours), June (72 hours), and August-September of 2018 (5 weeks). Limited solar CME activity during the 5-week campaign was observed in both the SUVI and LASCO C2 imagers. Some of the observations during this campaign include structures up to a few solar radii off the solar limb, and interesting coronal activity – both on and off the solar disk. They are presented here.

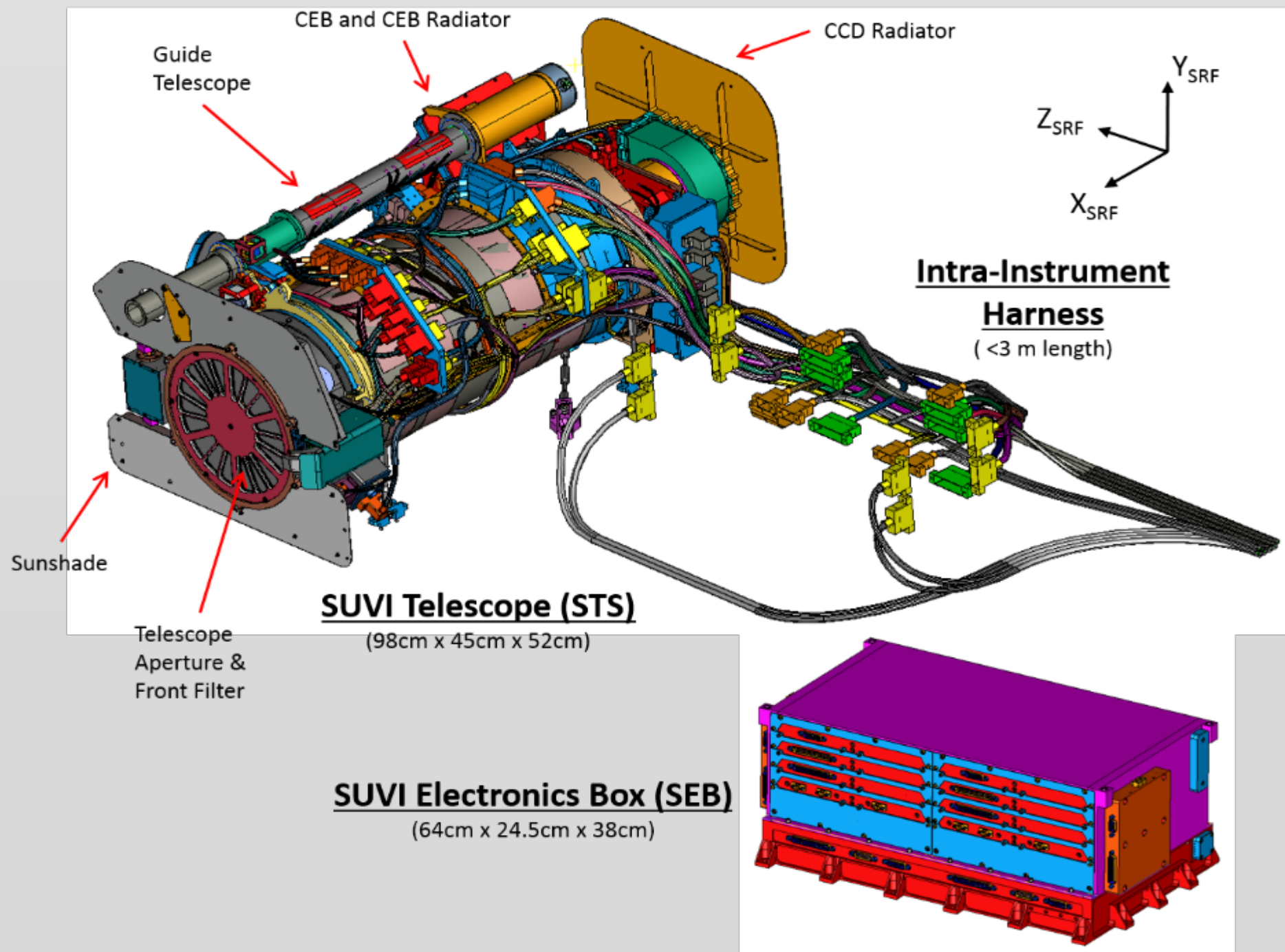
## Objectives

- Investigate the presence of solar EUV corona to a few solar radii
- Evaluate 17.1 nm and 19.5 nm for long term observations
- Explore CME detection capability

## The Spacecraft

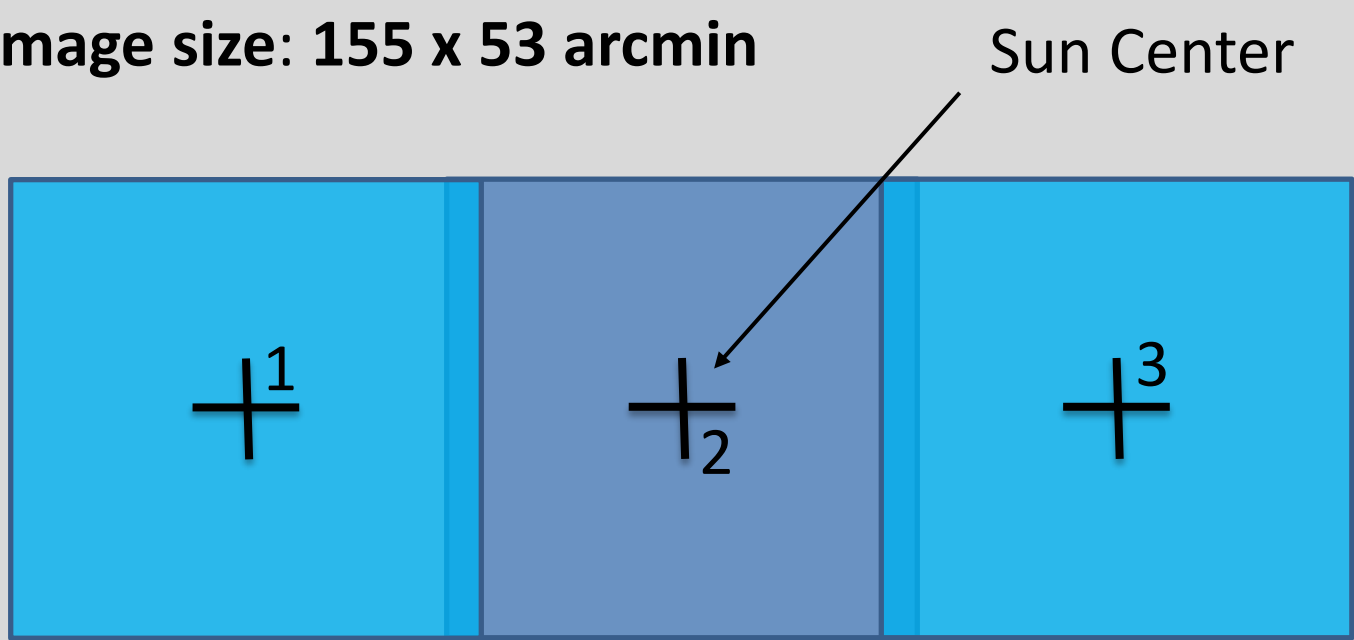


## The Solar UltraViolet Imager (SUVI)



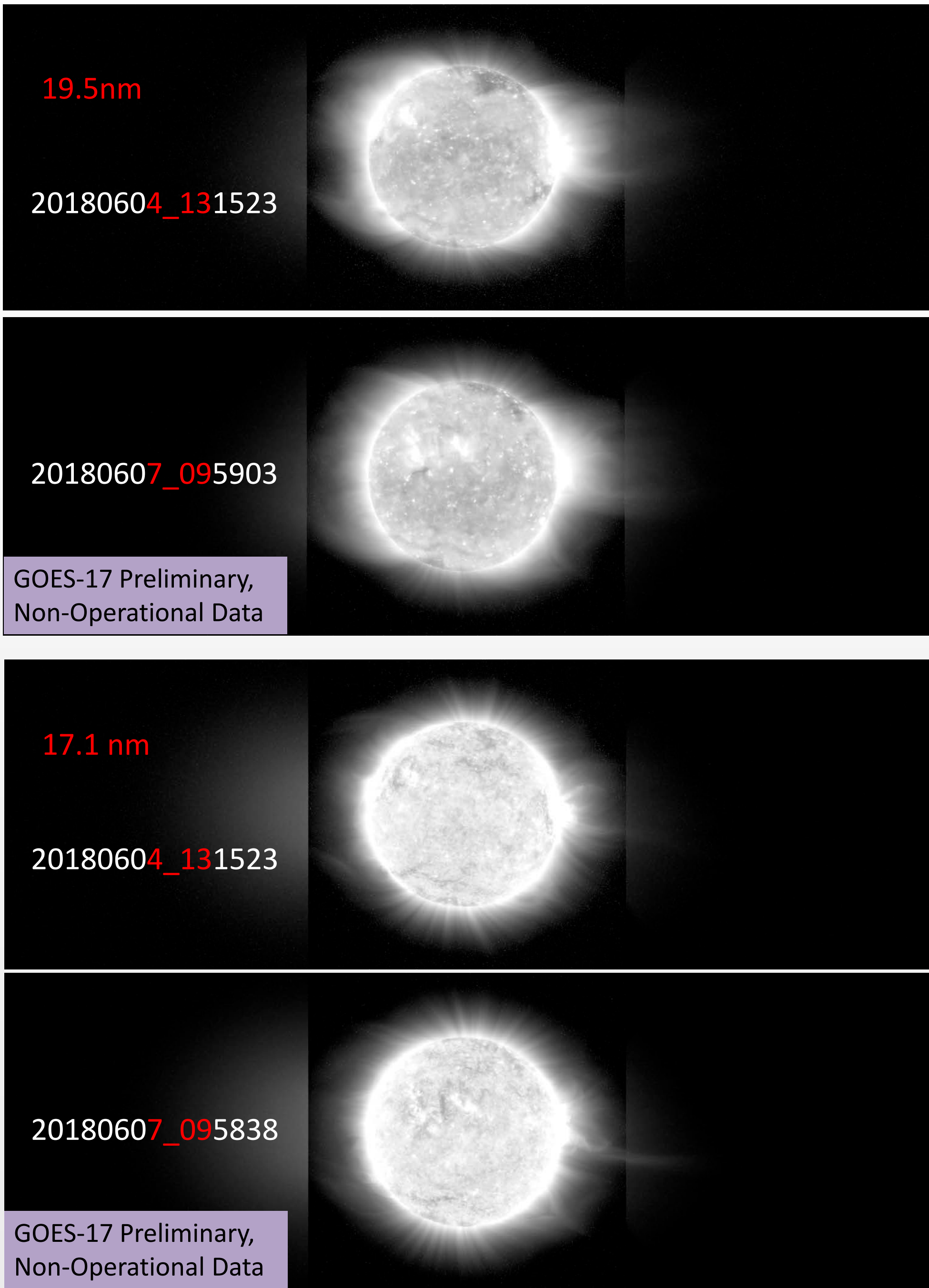
## The ECI Frame

Final image size: 155 x 53 arcmin



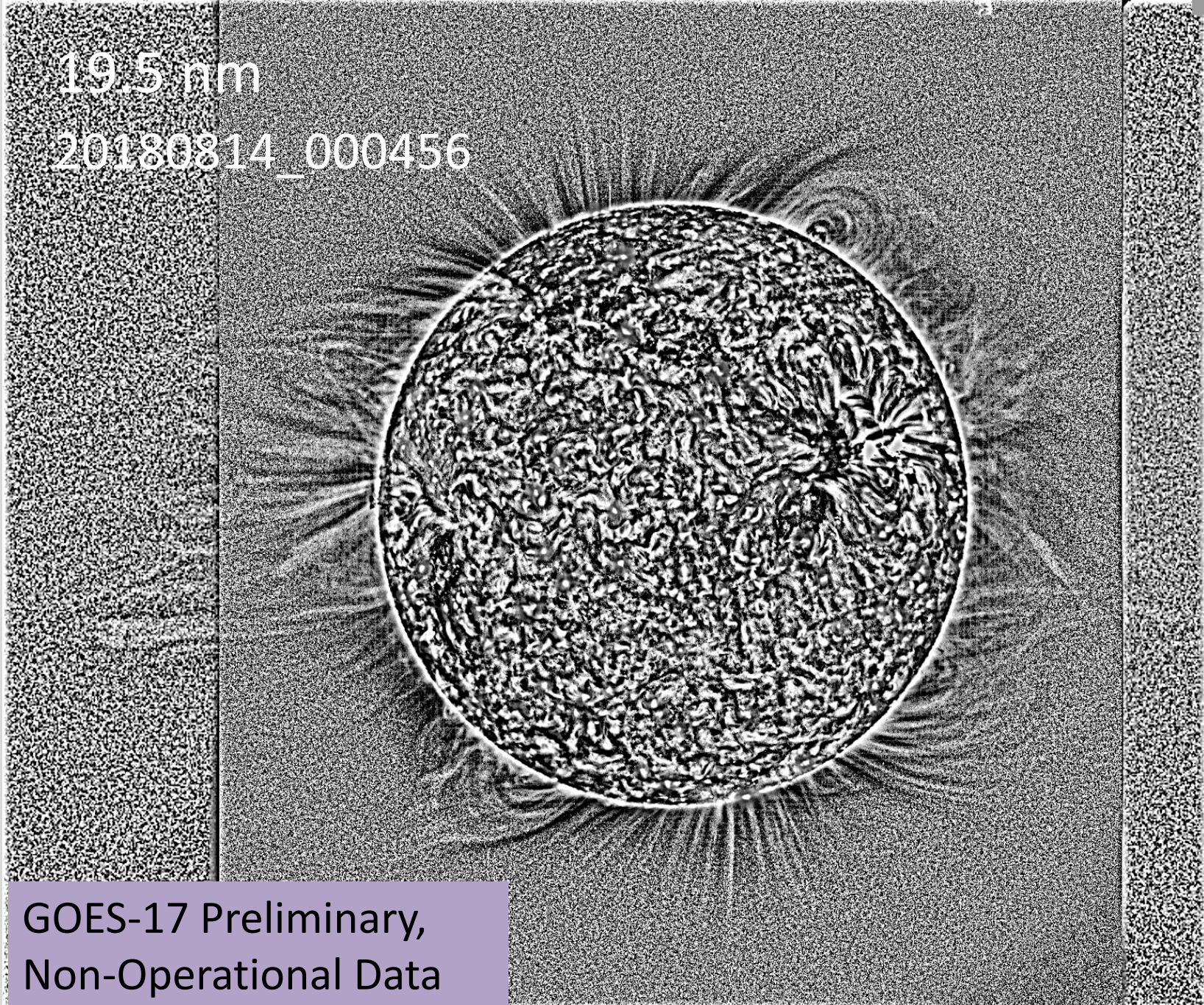
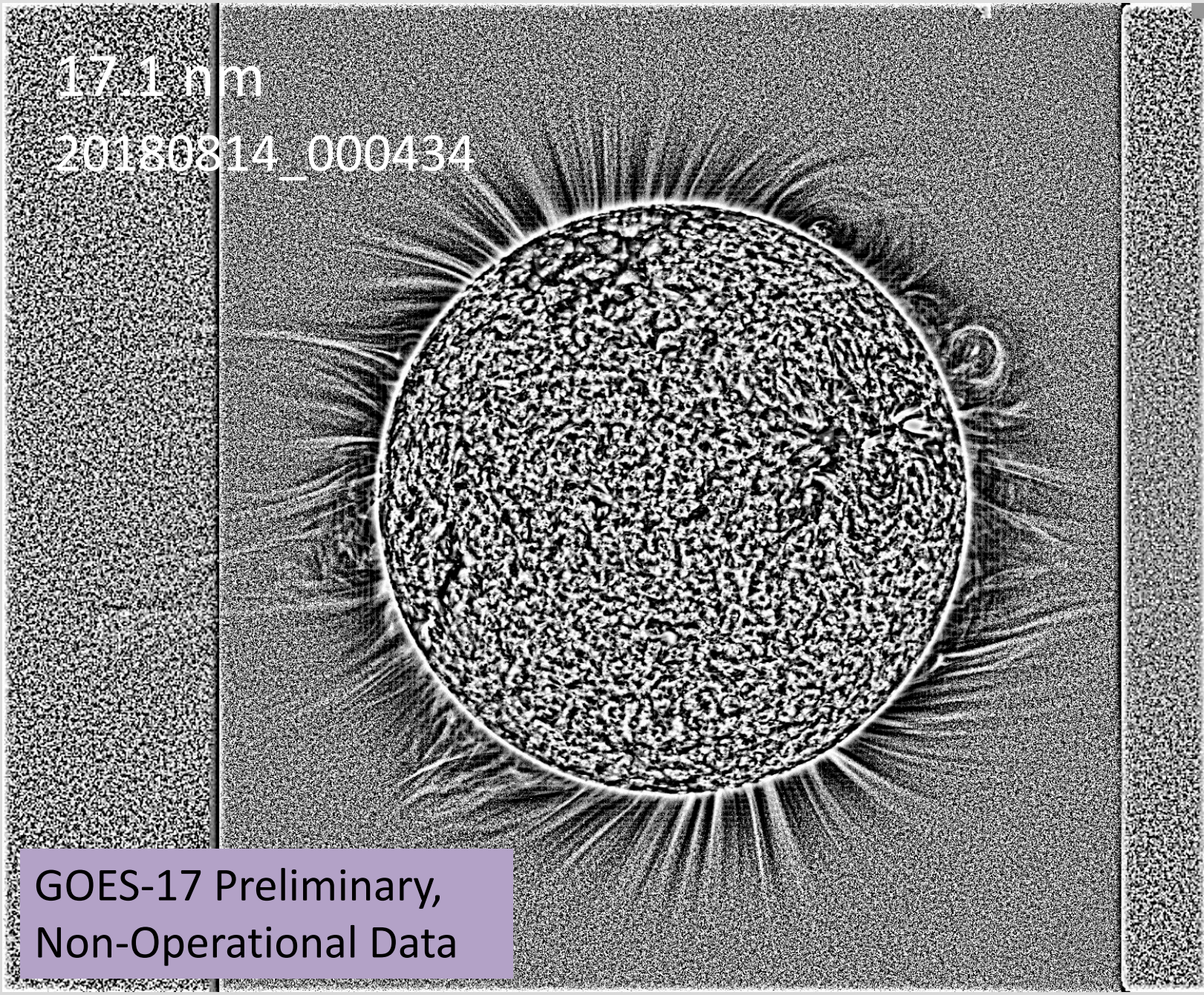
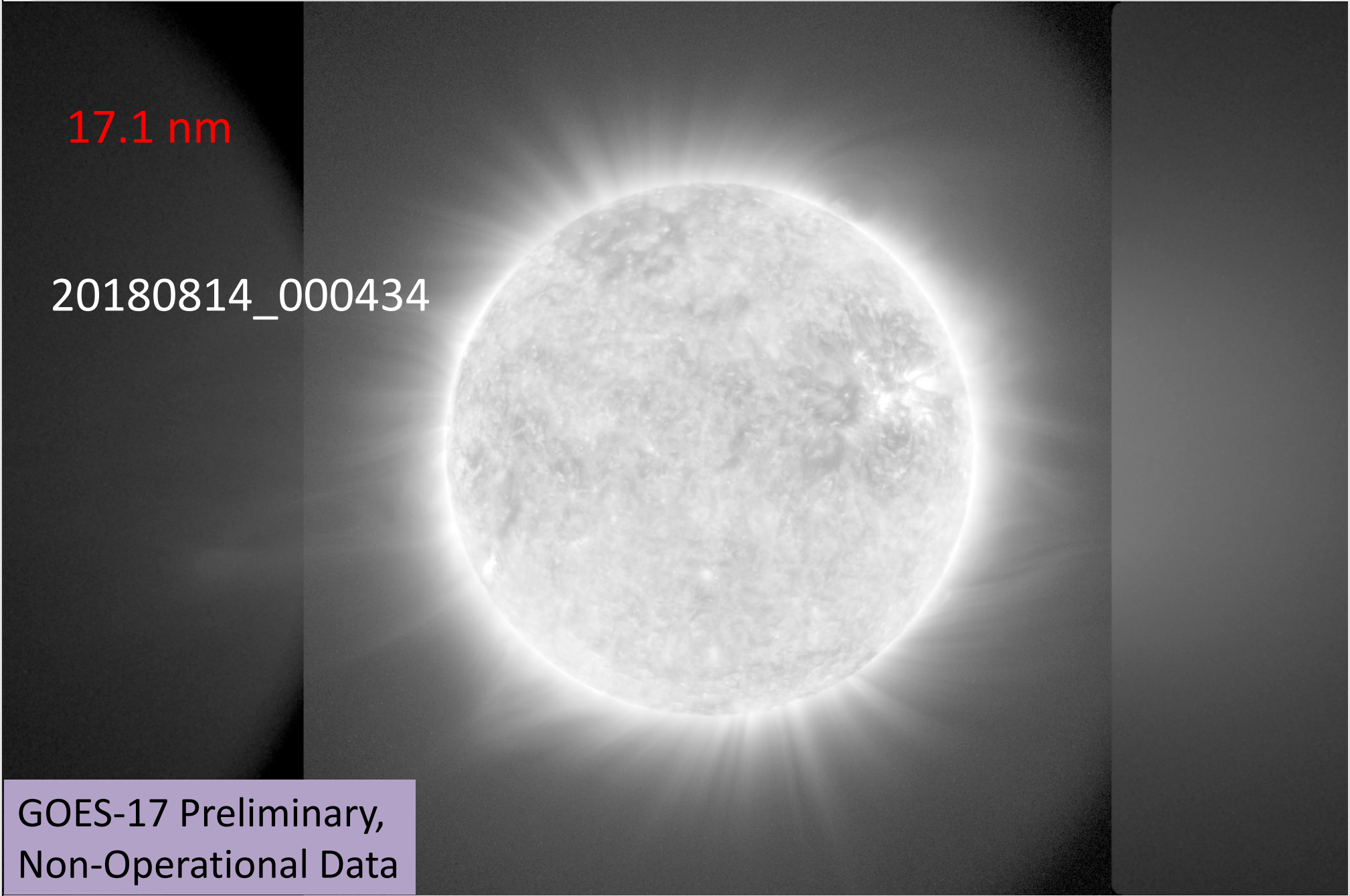
- Covers 4.5x Solar radii in E-W
- 17.1nm and 19.5nm (June 2018 campaign)
  - ECI frame Cadence: 5 min 48 secs
- 17.1nm, 19.5nm, and 30.4 nm (August 2018 campaign)
  - ECI frame Cadence: 6 min 32 secs
  - 10 secs exposure – center
  - 20 secs exposure – off-points
  - 2x2 on-chip binning onboard

## The June Campaign



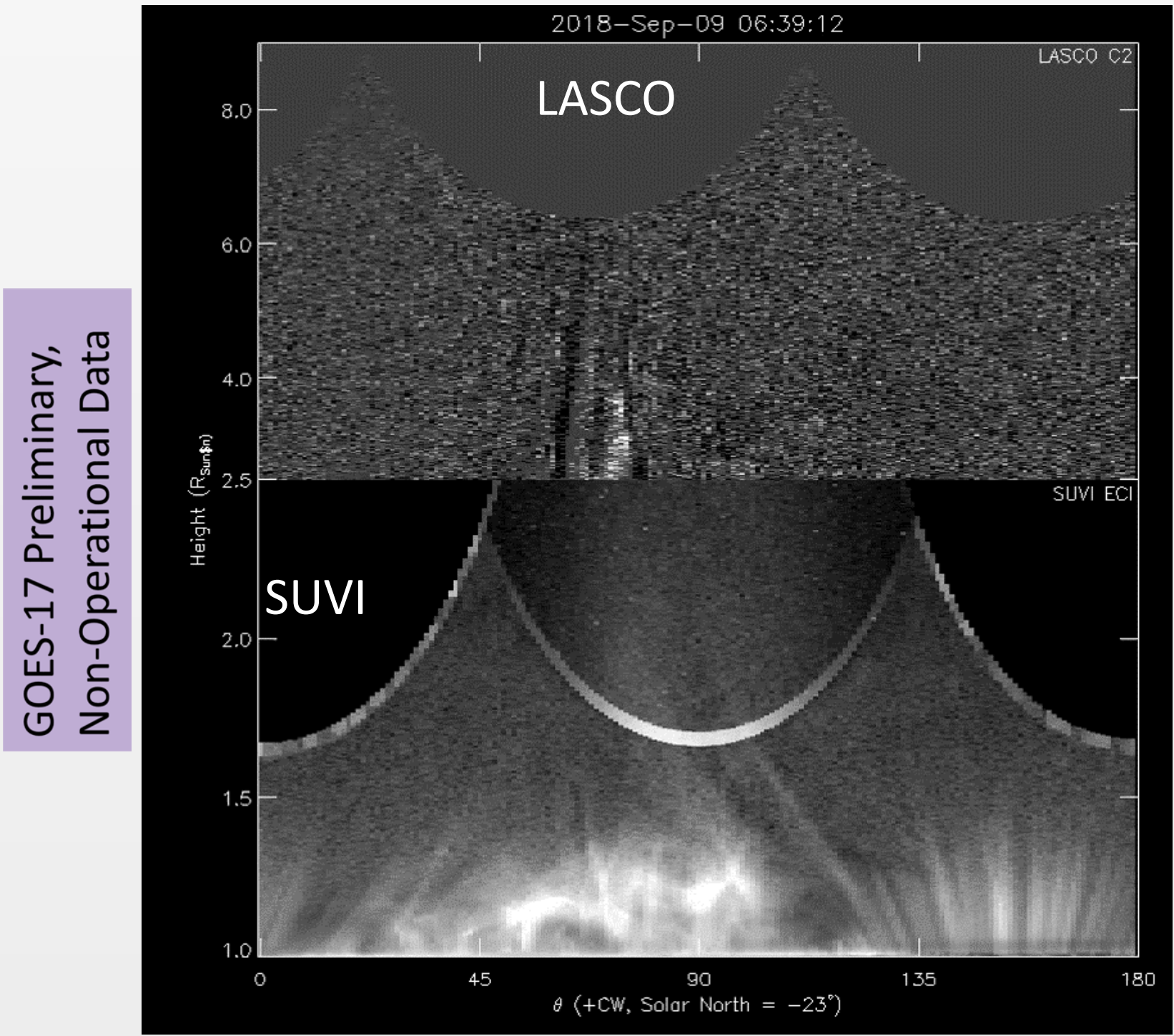
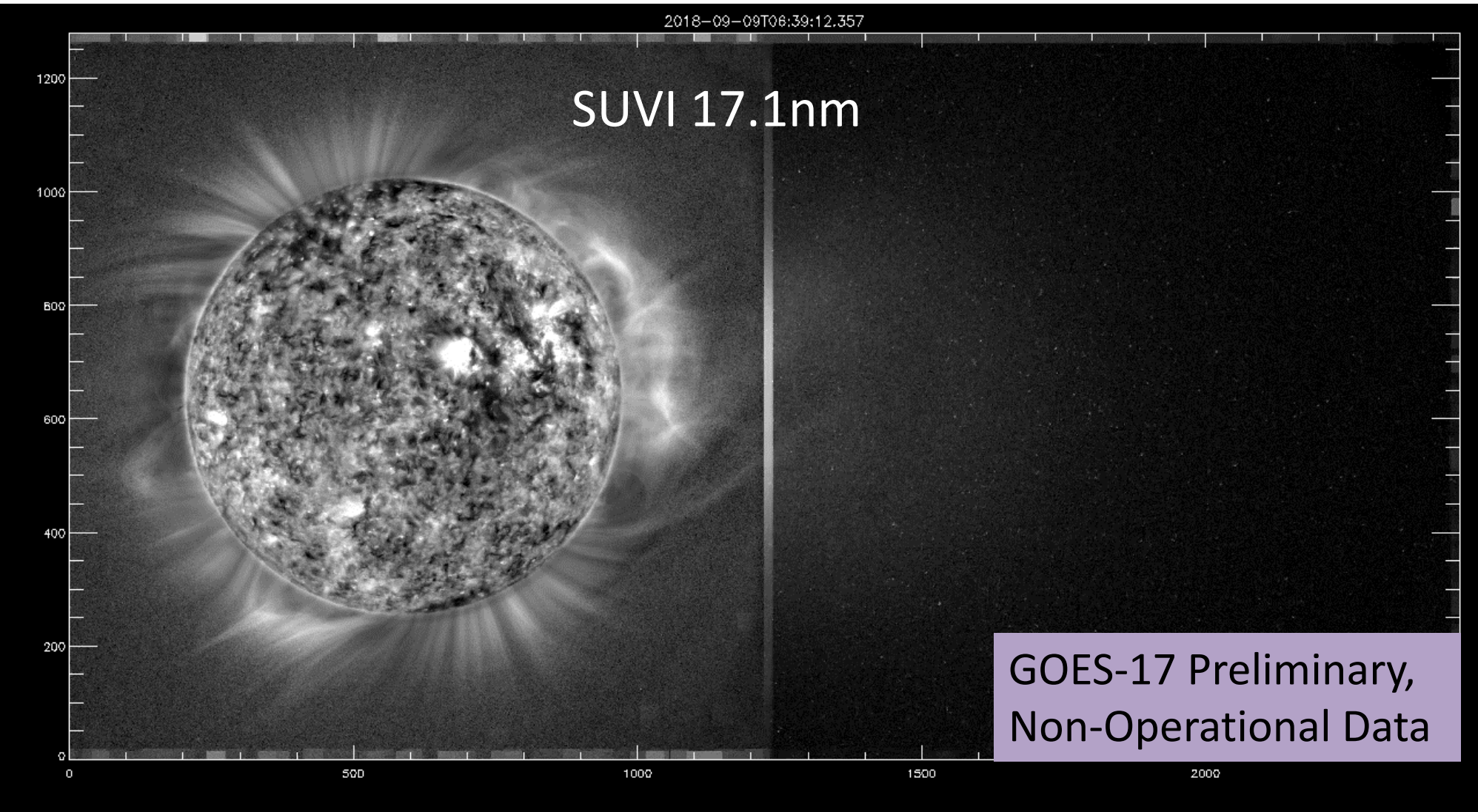
Significant activity far off the limb during the 72 hours

## Snippets from the August Campaign

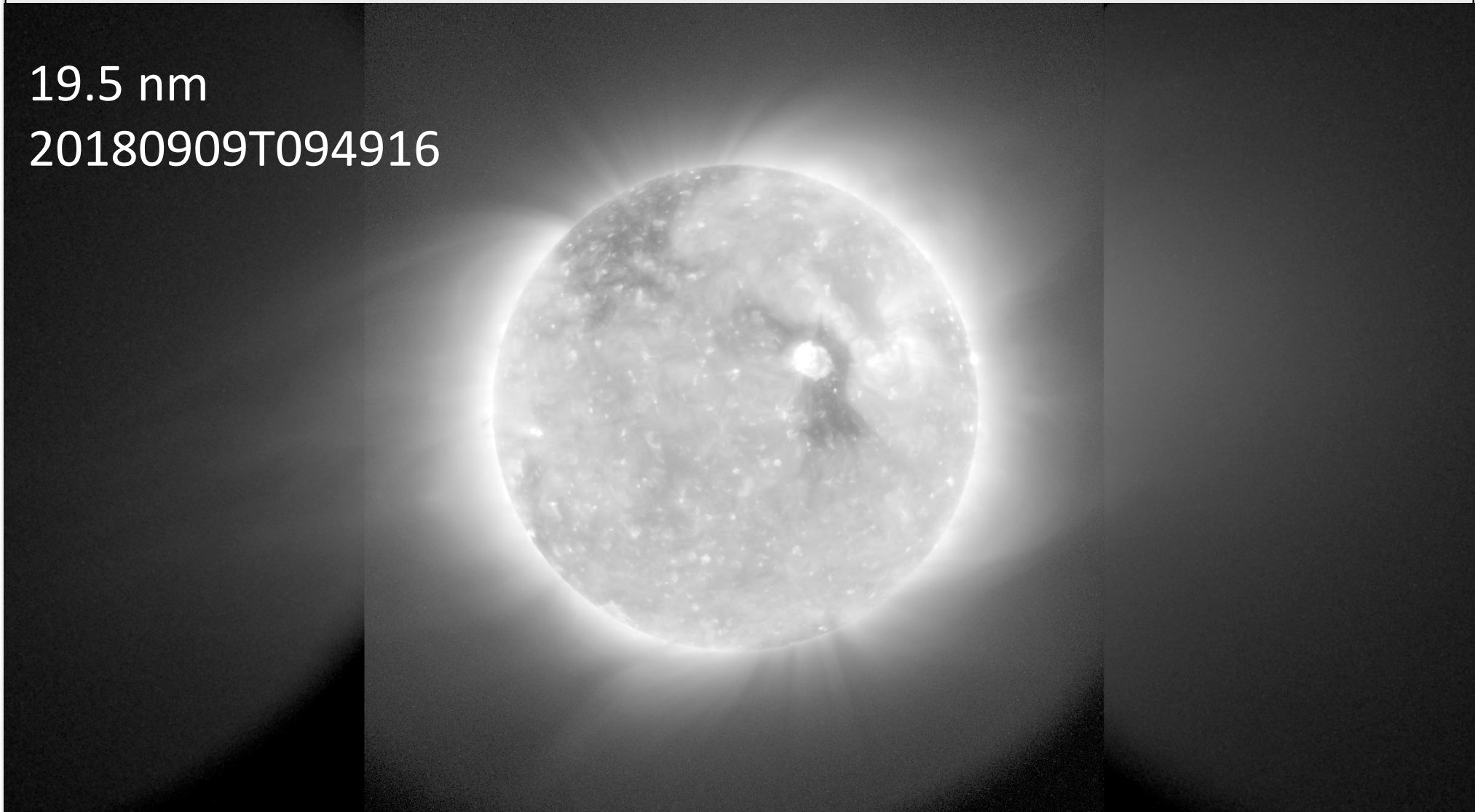


A loop forming and erupting near the 0 hrs off the west limb, streaming activity off the east limb during the day, prominences in the 7 O'clock position around 1700 UT, and another loop eruption on the top right quadrant around 2300 UT are features on 08/14/2018.

## CME 9/9/2018



19.5 nm  
20180909T094916



30.4 nm  
20180909T095506



CME activity clearly seen in 17.1nm and 30.4 nm off West limb. 19.5nm and 30.4 nm show interesting activity off the East limb as well.

## Conclusion

The ECI campaign with the SUVI on the GOES-R series spacecraft demonstrated the detectability of solar EUV corona up to three solar radii, even during the quiet portion of the solar cycle. Limited CME data, where available, was trended with LASCO observations. These data could be helpful to wide-field of view EUV imagers that are being proposed. These coronal observations could help extend understanding of heating of the corona and generation of the solar wind. Further and longer campaigns will enable collection of more data and could encompass a wide range of solar activity.

## References

Morgan, H., Druckmuller, M., "Multi-scale Gaussian Normalization for Solar Image Processing," Solar Physics, 2014, 289(8).  
Tadikonda, S. K., Minor, R. R., Seaton, D. B., Comeyne, G. J., and Krimchansky, A., "Coronal Imaging with the Solar UltraViolet Imager," Solar Physics, 2019, 294(3).